8FCS 6189B

30/98

Ilfracombe, Barnstaple

Agricultural Land Classification

July 1998

Resource Planning Team
Bristol
FRCA Western Region

RPT Job Number: 30/98

FRCA File No: EL10/00178

ILFRACOMBE

AGRICULTURAL LAND CLASSIFICATION SURVEY

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ILFRACOMBE

AGRICULTURAL LAND CLASSIFICATION SURVEY

INTRODUCTION

1. This report presents the findings of a detailed Agricultural Land Classification (ALC) survey of 122.1 ha of land at Ilfracombe. Field survey was based on 47 auger borings and 1 soil profile pit, and was completed in July 1998. During the survey 1 sample was analysed for particle size distribution (PSD).

2. The survey was conducted by the Resource Planning Team of FRCA Western Region on behalf of MAFF in its statutory role in the preparation of North Devon Local Plan.

3. Information on climate, geology and soils, and from previous ALC surveys was considered and is presented in the relevant section. Apart from the published regional ALC map (MAFF 1977), which shows the site at a reconnaissance scale as Grades 3 and 5, the site was previously surveyed in 1977 at a scale of 1: 50 000 (ADAS 1977). However, the current survey uses the Revised Guidelines and Criteria for Grading the Quality of Agricultural Land (MAFF, 1988) and supersedes any previous ALC survey. Grade descriptions are summarised in Appendix I.

4. At the time of survey land cover was mainly grass and rough grazing with one small field of cereals. An area of 19.2 ha of agricultural land within the survey area was not surveyed because permission for access was withheld. Other land which was not surveyed included mainly residential land, also a holiday camp, sports ground, a cemetery and several small parcels of waste ground around the west end of the cemetery.

SUMMARY

5. The distribution of ALC grades is shown on the accompanying 1: 10 000 scale ALC map. The detail of information shown at this scale is appropriate to the intensity of field survey but could be misleading if enlarged or applied to small areas. Areas are summarised in the Table 1.

Table 1: Distribution of ALC grades: Ilfracombe

Grade	Area (ha)	% Surveyed Area (69.5 ha)
2	0.6	1
3a	14.4	21
3b	33.7	48
4	9.6	14
5	11.2	16
Agricultural land not surveyed	19.2	
Other land	33.4	
Total site area	122.1	

6. This shows that only 22% of the area surveyed was found to be best and most versatile. This was mainly Subgrade 3a limited mainly by restricted workability. The rest of the area surveyed was found to be Subgrade 3b, Grade 4 and Grade 5 all mainly limited by gradient but also by restricted soil depth and microrelief where outcrops of slate occur as tors around the west and north of the site.

CLIMATE

7. Estimates of climatic variables for this site were derived from the published agricultural climate dataset "Climatological Data for Agricultural Land Classification" (Meteorological Office, 1989) using standard interpolation procedures. Data for key points around the site are given in Table 2 below.

8. Since the ALC grade of land is determined by the most limiting factor present, overall climate is considered first because it can have an overriding influence by restricting land to a lower grade despite more favourable site and soil conditions. Parameters used for assessing overall climate are accumulated temperature, a measure of relative warmth and average annual rainfall, a measure of overall wetness. The results shown in Table 2 indicate that there is an overall climatic limitation which limits the land to Grade 2.

9. Climatic variables also affect ALC grade through interactions with soil conditions. The most important interactive variables are Field Capacity Days (FCD) which are used in assessing soil wetness and potential Moisture Deficits calculated for wheat and potatoes, which are compared with the moisture available in each profile in assessing soil droughtiness limitations. These are described in later sections. A critical boundary of 225 FC Days was found to run approximately along the 140-145 metre contour.

Table 2: Climatic Interpolations: Ilfracombe

Grid Reference		SS 530 462	SS 524 473
Altitude (m)		190	100
Accumulated Temperature (day °C)		1369	1471
Average Annual Rainfall (mm)		1169	1071
Overall Climatic Grade		2	2
Field Capacity Days		232	217
Moisture deficit (mm):	Wheat	61	76
	Potatoes	42	62

10. There was considered to be a limitation due to exposure on the highest land in the south of the site, but this would be no more than to Grade 2 and therefore would not be a primary limitation.

RELIEF

11. Altitude ranges from to 75 metres in the south west corner of the site to 193 metres near Channel Farm with mainly strong slopes, which limit the land to Subgrade 3b but with several areas of steeper slopes, particularly the steep valley sides to the west of Winsham Farm, which are limited to Grade 5 with some Grade 4. The main area not limited by gradient was found around Channel Farm in the south of the site.

12. The several areas of slate outcrop, mainly to the south of Bowden Farm were considered to give rise to a limitation due to microrelief in an otherwise more moderate overall gradient. However, the principal limitation around these outcrops was considered to be restricted soil depth.

GEOLOGY AND SOILS

13. The underlying geology of the site is shown on the published geology map (IGS, 1981) as Kentisbury slate through much of the north of the site with Morte slates in the south. This was entirely consistent with the findings of the current survey although there appear to be no distinction between the two types of slate with respect to ALC.

14. Soils were mapped by the Soil Survey of England and Wales at a reconnaissance scale of 1: 250 000 (SSEW, 1983) as Denbigh 1 Association. This is described as comprising well drained fine loamy and fine silty soils over rock with some similar soils having slowly permeable subsoils and slight seasonal waterlogging and with shallow soils locally. This was entirely borne out by the current survey which found mainly well drained profiles. At only two borings was a wetness limitation identified.

AGRICULTURAL LAND CLASSIFICATION

15. The distribution of ALC grades found by the current survey is shown on the accompanying 1: 10 000 scale map and areas are summarised in Table 1. The detail of information shown at this scale is appropriate to the intensity of field survey but could be misleading if enlarged or applied to small areas.

Grade 2

16. The small area of Grade 2 shown in the north of the site is based on a single boring which found medium clay loam topsoil at Wetness Class I, a minor limitation due to restricted workability. This is included to illustrate a distinction from the area described as Subgrade 3a, below, as this small area lies below, 225 FC day boundary.

Subgrade 3a

17. The area shown as Subgrade 3a was also found to be medium clay loam topsoil at Wetness Class I but with climatic data indicating FC days in excess of 225. This is illustrated by Pit 1 which was located to test the droughtiness grade of a shallower phase of such profiles where weathered slate was encountered within the upper to middle subsoil over impenetrable slate rock within 80 cm. Stone contents at this pit were assessed by sieving and displacement

and found this profile to be droughtiness Grade 2. Most other borings within the area shown as Subgrade 3a were found to be deeper than at Pit 1 (ASP 100).

Subgrade 3b

18. The area shown as Subgrade 3b was found to be limited mainly by strong slopes of between 8 and 11°.

Grade 4

19. Much of the area shown as Grade 4 was found to be limited by gradient with moderately steep slopes of 12 to 18°.

20. Apart from overall gradient, the area shown as Grade 4 at Shield Tor (ASP 53) was also limited by the presence of repeated small outcrops of slate which prevent ploughing and harbour rabbits and represent a secondary limitation due to microrelief.

Grade 5

21. Much of the area shown as Grade 5 was found to be limited by steep slopes of around 20°.

22. Other small areas shown as Grade 5 to the south of Bowden Farm represent the occurrence of slate outcrops where restricted soil depth is the primary limitation, with bare rock in places.

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27 July 1998

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APPENDIX I

DESCRIPTION OF GRADES AND SUBGRADES

Grade 1 - excellent quality agricultural land

Land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly include top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality.

Grade 2 - very good quality agricultural land

Land with minor limitations which affect crop yield, cultivations or harvesting. A wide range of agricultural and horticultural crops can usually be grown but on some land in the grade there may be reduced flexibility due to difficulties with the production of the more demanding crops such as winter harvested vegetables and arable root crops. The level of yield is generally high but may be lower or more variable than Grade 1.

Grade 3 - good to moderate quality agricultural land

Land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2.

Subgrade 3a - good quality agricultural land

Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops.

Subgrade 3b - moderate quality agricultural land

Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass, or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year.

Grade 4 - poor quality agricultural land

Land with severe limitations which significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (eg cereals and forage crops) the yields of which are variable. In most climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land.

Grade 5 - very poor quality agricultural land

Land with very severe limitations which restrict use to permanent pasture or rough grazing, *except for occasional pioneer forage crops.*

Source: MAFF (1988) Agricultural Land Classification of England and Wales Revised Guidelines and Criteria for Grading the Quality of Agricultural Land, MAFF Publications, Alnwick.

APPENDIX II

DEFINITION OF SOIL WETNESS CLASSES

Soil wetness is classified according to the depth and duration of waterlogging in the soil profile.

Wetness Class I

The soil profile is not wet within 70 cm depth for more than 30 days in most years.

Wetness Class II

The soil profile is wet within 70 cm depth for 31-90 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 90 days, but not wet within 40 cm depth for more than 30 days in most years.

Wetness Class III

The soil profile is wet within 70 cm depth for 91-180 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 70 cm for more than 180 days, but only wet within 40 cm depth for between 31 and 90 days in most years.

Wetness Class IV

The soil profile is wet within 70 cm depth for more than 180 days but not within 40 cm depth for more than 210 days in most years or, if there is no slowly permeable layer within 80 cm depth, it is wet within 40 cm depth for 91-210 days in most years.

Wetness Class V

The soil profile is wet within 40 cm depth for 211-335 days in most years.

Wetness Class VI

The soil profile is wet within 40 cm depth for more than 335 days in most years.

Notes: The number of days specified is not necessarily a continuous period.

'In most years' is defined as more than 10 out of 20 years.

Source: Hodgson, J M (Ed) (1997) Soil Survey Field Handbook. Soil Survey Technical Monograph No 5, Silsoe.

APPENDIX III

ABBREVIATIONS AND TERMS USED IN SURVEY DATA

Soil pit and auger boring information collected during ALC survey is held on a computer database and is reproduced in this report. Terms used and abbreviations are set out below. These conform to definitions contained in the Soil Survey Field Handbook (Hodgson, 1997).

1. **Terms used on computer database, in order of occurrence.**

GRID REF: National 100 km grid square and 8 figure grid reference.

LAND USE: At the time of survey

WHT:	Wheat	**SBT:**	Sugar Beet	**HTH:**	Heathland
BAR:	Barley	**BRA:**	Brassicas	**BOG:**	Bog or Marsh
OAT:	Oats	**FCD:**	Fodder Crops	**DCW:**	Deciduous Wood
CER:	Cereals	**FRT:**	Soft and Top Fruit	**CFW:**	Coniferous Woodland
MZE:	Maize	**HRT:**	Horticultural Crops	**PLO:**	Ploughed
OSR:	Oilseed Rape	**LEY:**	Ley Grass	**FLW:**	Fallow (inc. Set aside)
POT:	Potatoes	**PGR:**	Permanent Pasture	**SAS:**	Set Aside (where known)
LIN:	Linseed	**RGR:**	Rough Grazing	**OTH:**	Other
BEN:	Field Beans	**SCR:**	Scrub		

GRDNT: Gradient as estimated or measured by hand-held optical clinometer.

GLEY, SPL: Depth in centimetres to gleying or slowly permeable layer.

AP (WHEAT/POTS): Crop-adjusted available water capacity.

MB (WHEAT/POTS): Moisture Balance. (Crop adjusted AP - crop potential MD)

DRT: Best grade according to soil droughtiness.

If any of the following factors are considered significant, 'Y' will be entered in the relevant column.

MREL:	Microrelief limitation	**FLOOD:**	Flood risk	**EROSN:**	Soil erosion risk
EXP:	Exposure limitation	**FROST:**	Frost prone	**DIST:**	Disturbed land
CHEM:	Chemical limitation				

LIMIT: The main limitation to land quality: The following abbreviations are used.

OC:	Overall Climate	**AE:**	Aspect	**EX:**	Exposure
FR:	Frost Risk	**GR:**	Gradient	**MR:**	Microrelief

FL:	Flood Risk	**TX:**	Topsoil Texture	**DP:**	Soil Depth
CH:	Chemical	**WE:**	Wetness	**WK:**	Workability
DR:	Drought	**ER:**	Erosion Risk	**WD:**	Soil Wetness/Droughtiness
ST:	Topsoil Stoniness				

TEXTURE: Soil texture classes are denoted by the following abbreviations:-

S:	Sand	**LS:**	Loamy Sand	**SL:**	Sandy Loam
SZL:	Sandy Silt Loam	**CL:**	Clay Loam	**ZCL**	Silty Clay Loam
ZL:	Silt Loam	**SCL:**	Sandy Clay Loam	**C:**	Clay
SC:	Sandy clay	**ZC:**	Silty clay	**OL:**	Organic Loam
P:	Peat	**SP:**	Sandy Peat	**LP:**	Loamy Peat
PL:	Peaty Loam	**PS:**	Peaty Sand	**MZ:**	Marine Light Silts

For the sand, loamy sand, sandy loam and sandy silt loam classes, the predominant size of sand fraction will be indicated by the use of the following prefixes:-

F: Fine (more than 66% of the sand less than 0.2mm)
M: Medium (less than 66% fine sand and less than 33% coarse sand)
C: Coarse (more than 33% of the sand larger than 0.6mm)

The clay loam and silty clay loam classes will be sub-divided according to the clay content: **M:** Medium (< 27% clay) **H:** heavy (27 - 35% clay)

MOTTLE COL: Mottle colour using Munsell notation.

MOTTLE ABUN: Mottle abundance, expressed as a percentage of the matrix or surface described.

F: few <2% **C:** common 2 - 20% **M:** many 20 - 40% **VM:** very many 40%+

MOTTLE CONT: Mottle contrast

F: faint - indistinct mottles, evident only on close inspection
D: distinct - mottles are readily seen
P: Prominent - mottling is conspicuous and one of the outstanding features of the horizon.

PED. COL: Ped face colour using Munsell notation.

GLEY: If the soil horizon is gleyed a 'Y' will appear in this column. If slightly gleyed, an 'S' will appear.

STONE LITH: Stone Lithology - One of the following is used.

HR: All hard rocks and stones **SLST:** Soft oolitic or dolimitic limestone

CH:	Chalk	**FSST:**	Soft, fine grained sandstone
ZR:	Soft, argillaceous, or silty rocks	**GH:**	Gravel with non-porous (hard) stones
MSST:	Soft, medium grained sandstone	**GS:**	Gravel with porous (soft) stones
SI:	Soft weathered igneous or metamorphic rock		

Stone contents are given in % by volume for sizes >2cm, >6cm and total stone >2mm.

STRUCT: The degree of development, size and shape of soil peds are described using the following notation

<u>**Degree of development**</u>	**WA:**	Weakly developed Adherent	**WK:**	Weakly developed
	MD:	Moderately developed	**ST:**	Strongly developed
<u>**Ped size**</u>	**F:**	Fine	**M:**	Medium
	C:	Coarse	**VC:**	Very coarse
<u>**Ped Shape**</u>	**S:**	Single grain	**M:**	Massive
	GR:	Granular	**AB:**	Angular blocky
	SAB:	Sub-angular blocky	**PR:**	Prismatic
	PL:	Platy		

CONSIST: Soil consistence is described using the following notation:

L:	Loose	**VF:**	Very Friable	**FR:**	Friable	**FM:**	Firm
VM:	Very firm	**EM:**	Extremely firm	**EH:**	Extremely Hard		

SUBS STR: Subsoil structural condition recorded for the purpose of calculating profile droughtiness: **G:** Good **M:** Moderate **P:** Poor

POR: Soil porosity. If a soil horizon has poor porosity with less than 0.5% biopores >0.5mm, a 'Y' will appear in this column.

IMP: If the profile is impenetrable to rooting a 'Y' will appear in this column at the appropriate horizon.

SPL: Slowly permeable layer. If the soil horizon is slowly permeable a 'Y' will appear in this column.

CALC: If the soil horizon is calcareous with naturally occurring calcium carbonate exceeding 1% a 'Y' will appear this column.

2. Additional terms and abbreviations used mainly in soil pit descriptions.

STONE ASSESSMENT:

VIS: Visual **S:** Sieve **D:** Displacement

MOTTLE SIZE:

EF:	Extremely fine <1mm	**M:**	Medium 5-15mm
VF:	Very fine 1-2mm>	**C:**	Coarse >15mm
F:	Fine 2-5mm		

MOTTLE COLOUR: May be described by Munsell notation or as ochreous (OM) or grey (GM).

ROOT CHANNELS: In topsoil the presence of 'rusty root channels' should also be noted.

MANGANESE CONCRETIONS: Assessed by volume

N:	None		**M:**	Many	20-40%
F:	Few	<2%	**VM:**	Very Many	>40%
C:	Common	2-20%			

POROSITY:

P: Poor - less than 0.5% biopores at least 0.5mm in diameter
G: Good - more than 0.5% biopores at least 0.5mm in diameter

ROOT ABUNDANCE:

The number of roots per $100cm^2$:		Very Fine and Fine	Medium and Coarse
F:	Few	1-10	1 or 2
C:	Common	10.25	2 - 5
M:	Many	25-200	>5
A:	Abundant	>200	

ROOT SIZE

VF:	Very fine	<1mm	**M:**	Medium	2 - 5mm
F:	Fine	1-2mm	**C:**	Coarse	>5mm

HORIZON BOUNDARY DISTINCTNESS:

Sharp:	<0.5cm	**Gradual:**	6 - 13cm
Abrupt:	0.5 - 2.5cm	**Diffuse:**	>13cm
Clear:	2.5 - 6cm		

HORIZON BOUNDARY FORM: Smooth, wavy, irregular or broken.*
* See Soil Survey Field Handbook (Hodgson, 1997) for details.

SITE NAME	PROFILE NO.	SLOPE AND ASPECT	LAND USE		PARENT MATERIAL
Ilfracombe	Pit 1 (ASP 100)	4° NW	PGR	Av Rainfall: 1169 mm ATO: 1369 day °C	Morte slates
JOB NO.	DATE	GRID REFERENCE	DESCRIBED BY	FC Days: 232	PSD SAMPLES TAKEN
30.98	7.7.98	SS 5300 4621	PB	Climatic Grade: 2 Exposure Grade: 2	TS 0-25 cm: MCL (S32:Z46:C22%)

Horizon No.	Lowest Av. Depth (cm)	Texture	Matrix (Ped Face) Colours	Stoniness: Size,Type, and Field Method	Mottling Abundance, Contrast, Size and Colour	Mangan Concs	Structure: Ped Development Size and Shape	Consistence	Structural Condition	Pores (Fissures)	Roots: Abundance and Size	Calcium Carbonate Content	Horizon Boundary: Distinctness and form
1	24	MCL	10YR43	1%. 2 cm (s) 15%< 2 cm (s+d) 16% HR, ZR	0	0	-	-	-	-	MF,VF	-	Clear Smooth
2	40	H(Z)CL	10YR44,54	25%>2 cm (s) 30%<2 cm (s+d) 55% ZR	0	0	MDFSAB	FR	G	G	CF,VF	-	Grad Smooth
3	70	H(Z)CL	10YR63	35%>2 cm (s) 30% <2cm (s+d) 65% ZR	0	0	Too stony	-	(M)	(G)	FVF	-	Clear Wavy
4	78+	-	-	Slate rock	-	-	-	-	-	-	-	-	

Profile Gleyed From: -	Available Water	Wheat:	98 mm	Final ALC Grade: 3a
		Potatoes:	91mm	
Slowly Permeable Horizon From: -	Moisture Deficit	Wheat:	76 mm	Main Limiting Factor(s): Wk
Wetness Class: I		Potatoes:	62 mm	
Wetness Grade: 3a	Moisture Balance	Wheat:	+22 mm	Remarks:
		Potatoes:	+29 mm	
	Droughtiness Grade: 2	(Calculated to 100 cm)		

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